भारतीय मानक

Indian Standard

IS 2258 : 2023

वेल्लित जिंक प्लेट, चद्दर और पट्टी — विशिष्टि

(तीसरा पुनरीक्षण)

Rolled Zinc Plate, Sheet and Strip — Specification

(Third Revision)

ICS 77.150.60

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

November 2023 Price Group 6

Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/Alloys and Products Sectional Committee, MTD 09

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/Alloys and Products Sectional Committee had been approved by the Metallurgical Engineering Division Council.

The standard was published in 1962 and subsequently revised in 1967 and 1981. The first revision of the standard was undertaken as a result of experience gained during the previous years and it was decided to remove the magnesium bearing grade of rolled zinc from the standard. In the second revision the copper bearing grade of rolled zinc was deleted from this Indian standard. This present third revision has been undertaken as a result of experience gained during the following years and the following major modifications have been done in this current revision:

a) The use of Grade II mentioned in **4** has been modified by deleting soldered zinc can, as it was obsolete and currently not in practice/manufactured;

b) The reference clause has been incorporated;

c) The definition of rolled zinc has been added;

d) The chemical composition clause has been modified by including relevant parts of IS 2600 for chemical analysis and also any other established method either wet traditional or instrumental methods can now be used for assessing the chemical composition of the grades;

e) IS 1599 for bend test has been referred to for carrying out the bend test;

f) The lower limit on the lead content that is 0.8 percent in Grade III has been deleted as lower lead containing grades are being manufactured in the country having lead content less than 0.8 percent; and

g) Ordering clause has been added.

The rolled zinc specified in this standard is used for making eyelets and grommets; address plates; drawn, extruded battery cans; photoengravers plates; weather strips; boiler and ship plates etc.

For benefit of the purchaser, an informative Annexure (*see* Annex A) giving dynamic ductility test for rolled zinc sheet and strip up to 1.25 mm thick and temper test up to 0.85 mm thick, has been included, wherever ductility and temper properties are important.

The grade and chemical composition of rolled zinc along with special test requirements, if any, for a specific purpose should be specified by the purchaser when making an enquiry or placing an order. The use of compositions other than those specified in this standard shall be as agreed to between the purchaser and the manufacturer.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirements of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical value (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ROLLED ZINC PLATE, SHEET AND STRIP — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers the requirements for three grades of rolled zinc plate, sheet and strip.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subjected to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

IS No.	*Title*
IS 406 : 1964	Methods of chemical analysis of slab zinc (spelter) (*revised*)
IS 1387 : 1993	General requirements for the supply of metallurgical materials (*second revision*)
IS 1817 : 1961	Methods of sampling non-ferrous metals for chemical analysis
IS 1599 : 2023/ ISO 7438 : 2020	Metallic materials — Bend test (*fifth revision*)
IS 2600	Methods of chemical analysis of zinc and zinc base alloys for die castings:
(Part 1) : 1988	Determination of copper, iron, nickel, tin and thallium by spectrophotometric method (*first revision*)
(Part 2) : 1988	Determination of copper, iron, lead and cadmium by atomic absorption spectrophotometric method (*first revision*)
(Part 5) : 2022	Analysis by inductively coupled plasma optical emission spectrometry (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply:

3.1 Rolled Zinc — Wrought zinc or zinc alloy sheet, strip, or plate produced by hot and/or cold rolling.

3.2 Plate — Material, generally flat, of uniform specified thickness over 10 mm and width over 500 mm and cut to length.

3.3 Sheet — Material, generally flat, of uniform specified thickness over 0.15 mm up to and including 10 mm, and width over 500 mm.

3.4 Strip — Material, over 0.15 mm up to and including 10 mm in thickness and width up to and including 500 mm. It is usually supplied in coils but may be flat or folded. It is not generally cut to lengthwise.

4 GRADES

The rolled zinc plate, sheet and strip shall be of the following three grades:

Grade 1 — generally used for drawn applications and also for address plate manufacture and photoengraver plates.

Grade 2 — used for the weather strips and some drawn applications.

Grade 3 — mainly used for extruded battery cans.

5 SUPPLY OF MATERIAL

5.1 General requirements relating to the supply of rolled zinc plate, sheet and strip shall be as laid down in IS 1387.

5.2 Information to be Given by the Purchaser

5.2.1 *Basis for Order*

Orders for the material under this specification should include the following information:

a) The number of this Indian Standard;
b) Quantity (weight);
c) Name of the material (rolled zinc);
d) Grade of the material;
e) Type of rolled zinc (plate, sheet or strip);
f) Dimensions (thickness, width, length);

g) Chemical composition;
h) Test certificate; and
j) Others as agreed between purchaser and the supplier.

6 FREEDOM FROM DEFECTS

The material when supplied in the form of plate, sheet and strip shall have a clean and smooth surface free from scratches, blisters, inclusions and discoloration.

7 CHEMICAL COMPOSITION

7.1 The chemical composition of the material shall conform to the requirements as given in Table 1.

7.2 The chemical composition shall be determined either by the, combination of the methods specified in IS 406 and IS 2600 (Part 1) so that the scope of the method of analysis shall fit into the chemical compositions scope of the product, or by the atomic absorption spectrophotometric method specified in IS 2600 (Part 2), or by ICP-OES method specified in IS 2600 (Part 5) or any other established instrumental/classical wet chemical methods. In case of dispute, the wet chemical analysis methods (either instrumental or classical wet chemical analysis), as mutually agreed between the purchaser and the manufacturer, shall be used as referee method.

8 BEND TEST

8.1 Where necessary bend test on rolled zinc plate, sheet and strip shall be carried in accordance with IS 1599.

8.2 Bend test specimens shall be selected by the purchaser either from shearing or from plate, sheet or strip after they have been cut to the size required or specified. Test specimens shall be cut both lengthwise and crosswise, and where practicable shall be L-shaped so as to permit both length and cross bend tests being done on the same piece. All test specimens shall be stamped with an arrow to indicate the direction of the length of the sheet.

8.3 Specimens cut both lengthwise and crosswise from sheet or strip 1.50 mm or less in thickness shall, without fracture, withstand being bent through an angle of 180° so that the internal diameter of the bend is equal to the thickness of the sheet or strip.

8.4 Specimens cut both lengthwise and crosswise from plate, sheet or strip over 1.50 mm in thickness shall, without fracture withstand being doubled over with an included radius equal to twice the thickness of the sheet.

9 SIZES

The sizes for zinc plate, sheet and strip shall be as agreed to between the purchaser and the manufacture.

Table 1 Chemical Composition of Rolled Zinc

(*Clause* 7.1)

Sl No.	**Constituent**	**Requirement in Weight Percent**		
	Grade	Grade 1	Grade 2	Grade 3
(1)	(2)	(3)	(4)	(5)
i)	Lead, *Max*	0.20	0.15 to 0.60	1.00
ii)	Cadmium, *Max*	0.10	0.15 to 0.60	0.07
iii)	Iron, *Max*	0.010	0.020	0.007
iv)	Copper, *Max*	0.005	0.005	0.001
v)	Zinc, *Min*	Remainder	Remainder	Remainder

10 TOLERANCES

10.1 The permissible variations in thickness of rolled material shall be as follows:

Sl No.	*Material*	*Thickness*, mm	*Permissible Variation in Thickness*
(1)	(2)	(3)	(4)
i)	Sheet and coil cut from rolled strip	Up to and including 1.0	± 0.05 mm
		Over 1.0	± 5 percent
ii)	Pack-rolled sheet and strip	Up to and including 1.0	± 0.08 mm
		Over 1.0	± 8 percent
iii)	Plate	All thicknesses	+ 10 percent – 5 percent

10.1.1 Rolled zinc shall be gauged with a micrometer caliper. No two measurements along the length of the coil shall be made within 300 mm of each other, nor shall measurements in any one line across the width of the coil be used as a basis of rejection.

10.2 The permissible variations in width of rolled material shall be as follows:

Sl No.	*Thickness*		*Permissible Variation in Width*	
	Over (mm)	Up to and Including (mm)	Width up to and Including 350 mm (mm)	Width Over 350 mm (mm)
(1)	(2)	(3)	(4)	(5)
i)	—	3.15	± 1.5	± 2
ii)	3.15	6.3	± 3	± 4
iii)	6.3	9.5	± 4	± 6
iv)	9.5	40	± 6	± 8

10.3 When the material is ordered to exact lengths, the following variations in length may be permitted:

Sl No.	*Thickness* (mm)	*Permissible Variation in Length* (mm)
(1)	(2)	(3)
i)	Up to and including 12	± 3
ii)	Over 12 up to and including 40	± 6

10.4 Sidewise Bend or Curvature

The coil shall not exhibit sidewise bend or curvature in excess of 25 mm in any length of 3 m. The bend or curvature shall be determined by supporting the reel at one end of a table and drawing the strip along a 3 m straight-edge, keeping both ends of straight-edge touching the edge of the strip. No point on the straight-edge shall then be more than 25 mm from the edge of the strip.

11 SAMPLING AND CRITERIA FOR CONFORMITY

11.1 Lot

In any consignment, all boxes or crates containing zinc plate, sheet or strip of the same chemical composition and made by one manufacturer shall be grouped together to constitute a lot.

11.2 From each lot, samples as specified in Table 2 shall be selected at random, evenly distributed over all the boxes, cases or crates in the lot and inspected for freedom from defects (*see* **6**) and tolerance on dimensions (*see* **10**). The lot shall be considered as conforming to the corresponding requirements of this specification if the number of defectives (that is plate, sheet or strip not conforming to one or more of the requirements specified under **6** and **10**) is less than or equal to the permissible number specified in col (4) of Table 2.

Table 2 Sample Size and Permissible Number of Defectives

(*Clause* 11.2)

Sl No. (1)	**Lot Size (in Number)** (2)	**Sample Size** (3)	**Permissible Number of Defectives**[1] (4)
i)	Up to 100	5	0
ii)	101 to 200	15	1
iii)	201 to 300	25	2
iv)	301 to 500	35	3
v)	501 and above	45	4

11.3 Specimen material from one of the plates, sheets or strips in each lot shall be subjected to chemical analysis test specified under **7.2** and where necessary also for bend test specified under **8**.

NOTE — The material required for chemical analysis from each of the plates, sheets or strips intended for testing shall be collected from the ends, in accordance with IS 1817.

11.3.1 The lot shall be considered as conforming to the requirements of chemical composition and bend test if the results of tests satisfy the corresponding requirements specified under **7.1** and **8** respectively. If the requirements of one or both of these tests are not satisfied, two more test specimens shall be subjected to each of the tests in which the failure has occurred, in order to confirm that the testing has been done properly. If the results of both retest satisfy the relevant requirements, the lot shall be considered as conforming to the requirements of this specification, otherwise not.

12 PACKING

The material shall be packed in boxes, cases or crates so constructed as to ensure ease of handling and avoid damage during transit. When the material is supplied in coils it shall consist of not more than four pieces. No piece shall be less than 3 m in length.

13 MARKING

13.1 Each box, case or crate shall be legibly marked with the manufacturer's name, trade-mark, grade and size of the material, and gross and net weights.

13.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

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[1] This ensures that the lots containing only 4 percent or less defectives will be accepted most of the times.

ANNEX A

(*Foreword*)

DYNAMIC DUCTILITY AND TEMPER TEST FOR ROLLED ZINC

A-1 The tests described in the following clauses are used in the rolled-zinc trade. The range of properties obtainable from strip and pack-rolled zinc have been given in Table 3 for information only. In the case of strip-rolled zinc properties obtainable under different conditions of temper, that is dead-soft, soft, half-hard and hard, have been given.

A-2 DYNAMIC DUCTILITY TEST

A-2.1 Apparatus — A modified inclinable power press fitted with an adjustable die shall be used for testing. The speed of the machine shall be 85 to 90 oscillations of the plunger per minute.

A-2.2 Test Specimens

A-2.2.1 The test specimen shall be a strip about 40 mm wide made after cutting across the full width of a ribbon or sheet. When this results in a specimen less than 300 mm in length, as from narrow unslit ribbon zinc, two specimens 90 mm in width shall be cut.

A-2.2.2 Test specimens from narrow strips, such as ribbon or sheet zinc after slitting shall be cut to 500 mm lengths.

A-2.3 Procedure

A-2.3.1 The temperature of the test specimen, testing machine and room shall be kept within 21 °C to 32 °C throughout the test.

A-2.3.2 The specimen shall be inserted in the machine and firmly clamped. The testing shall be started from one end and the strip moved with each successive cup. The series of cups shall be along the middle line of a 90 mm strip so that clamping will be uniform around the cup as it is formed. With the motor running, the clutch shall be thrown in, lowering the plunger, which with the die in the clamp base, presses the cup in the test strip. If the cup does not show rupture, the plunger shall be advanced by increments of 0.1 mm and the cupping repeated with each increased depth until rupture occurs. Having determined the rupturing point additional cups shall be formed as a check. The rupturing point shall not be considered to be that point where an open crack is formed, but where the drawing of the bottom of the cup has just caused necking of the surface prior to rupture.

A-2.3.3 The depth of the cup at which rupture first occurs shall be read from the micrometer attachment on the plunger and reported as dynamic ductility of the specimen.

NOTE — The micrometer attachment on the plunger mechanism measure the distance that plunger extends beyond the zero point. The zero point is where no impression would be made on the test strip. The clamp base is adjusted for the thickness. The micrometer attachment also serves to advance and withdraw the plunger.

A-2.4 The typical dynamic ductility test values for the strip and pack rolled zinc are given in Table 3.

A-3 TEMPER TEST

A-3.1 Test Specimens — Duplicate test specimens shall be cut from each sample and shall be rectangular in shape and cut accurately to 30 mm in width and 120 mm in length with the length taken in the direction of rolling. With ribbon zinc the duplicate test specimens shall be cut from adjacent places across the width of sample.

A-3.2 Procedure

A-3.2.1 The temperature of the test specimen, testing machine and room shall be kept within 21 °C to 32 °C throughout the test.

A-3.2.2 The specimen shall be inserted to the full depth of the vice of the mandrel and securely held by tightening the vice. The diameter of the mandrel is 63 mm. Inserting the test specimen as specified to the full depth of the vice leaves extended a length exactly one-half the circumference of the mandrel. In the rotation of the mandrel, the test specimen is pressed by the contact arm against the mandrel. When the outer or free end passes the contact arm, it springs out according to its temper. The speed of the rotation of the mandrel shall be between 50 rev/min to 55 rev/min. With the motor running, the clutch shall be thrown in, rotating the mandrel counter-clock-wise. When the outer end of the test specimen has passed the contact arm, the rotation of the mandrel shall be stopped by throwing out the clutch. The mandrel shall turn to the 100 percent position which is indicated by a mark on the mandrel and the fixed pointer, and the percentage of temper shall be read from the position of the outer end of the specimen on the underlying graduated scale, consisting of a semicircle graduated counter-clockwise from 0 percent to 100 percent.

A-3.2.3 The duplicate specimen shall be similarly tested and in order to eliminate the effect of the curvature of the test specimen due to coiling, shall be inserted in the vice in the reverse position to that of first specimen. That is, if one specimen is inserted and pressed with its curvature towards the mandrel, the duplicate specimen should be inserted with its curvature away from the mandrel.

A-3.2.4 The average of the readings on the two test specimens, shall be reported as the temper of the material.

A-3.2.5 The typical temper test results for the strip-and pack-rolled zinc are as given in Table 3.

Table 3 Dynamic Ductility and Temper Test Values for Rolled Zinc

(*Clauses* A-1, A-2.4 *and* A-3.2.5)

Sl No.	**Thickness**	**Strip (Ribbon) Rolled Zinc**								**Pack-Rolled Zinc**	
		Dead-Soft		Soft		Half-Hard		Hard			
		Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*
	mm	mm	percent	mm	percent	mm	percent	mm	percent	mm	percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	0.15	7.0	70	6.5	76	5.5	80	4.2	86	4.2	88
ii)	0.20	7.1	65	6.6	72	5.6	75	4.3	83	4.3	77
iii)	0.25	7.2	60	6.7	66	5.7	70	4.4	80	4.4	73
iv)	0.30	7.4	55	6.9	62	5.8	65	4.6	77	4.6	69
v)	0.35	7.5	52	7.0	58	6.0	61	4.7	74	4.7	65
vi)	0.40	7.6	48	7.1	54	6.1	58	4.8	72	4.8	62
vii)	0.45	7.7	46	7.2	51	6.2	54	5.0	69	5.0	58
viii)	0.50	7.9	43	7.4	48	6.4	51	5.1	68	5.1	57
ix)	0.56	8.0	41	7.5	45	6.5	48	5.2	65	5.2	55
x)	0.60	8.1	40	7.6	43	6.6	45	5.3	63	5.3	54
xi)	0.67	8.3	39	7.7	40	6.7	43	5.5	61	5.5	52
xii)	0.71	8.4	37	6.9	37	6.9	42	5.6	59	5.6	51
xiii)	0.75	8.5	37	8.0	37	7.0	42	5.7	58	5.7	49
xiv)	0.80	8.6	36	8.1	36	7.1	41	5.8	57	5.8	48
xv)	0.85	8.8	36	8.3	36	7.2	40	6.0	56	6.0	47
xvi)	0.90	8.8	—	8.3	—	7.4	—	6.1	—	6.1	—
xvii)	0.95	8.9	—	8.3	—	7.5	—	6.2	—	6.2	—
xviii)	1.00	8.9	—	3.4	—	7.6	—	6.4	—	6.4	—
xix)	1.06	8.9	—	8.4	—	7.6	—	6.4	—	6.4	—

Table 3 (*Concluded*)

Sl No.	**Thickness**	**Strip (Ribbon) Rolled Zinc**								**Pack-Rolled Zinc**	
		Dead-Soft		Soft		Half-Hard		Hard			
		Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*	Dynamic Ductility, *Min*	Temper, *Max*
	mm	mm	percent	mm	percent	mm	percent	mm	percent	mm	percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
xx)	1.12	9.0	—	8.4	—	7.7	—	6.5	—	6.5	—
xxi)	1.18	9.0	—	8.4	—	7.7	—	6.5	—	6.5	—
xxii)	1.25	9.0	—	8.6	—	7.9	—	6.6	—	6.6	—

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Ores and Feed Stock for Non-Ferrous (Excluding Aluminium and Copper) Industry, their Metals/Alloys and Products Sectional Committee, MTD 09

Organization	*Representative(s)*
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Bhabha Atomic Research Centre, Mumbai	Dr Dhruva Kumar Singh Dr Bhaskar Paul (*Alternate* I) Shri Rajak Syed (*Alternate* II)
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Organization	*Representative(s)*
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(Metallurgical Engineering), BIS

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This Indian Standard has been developed from Doc No.: MTD 09 (20250).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

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Published by BIS, New Delhi